

## **Sampling and Analysis Plan**

### **2008-2009 Storm Season - Port of Stockton**

#### **Background**

This Sampling and Analysis Plan is presented to ensure the Port of Stockton's (Port) compliance with the California Regional Water Quality Control Board's Waste Discharge Requirements Order Number R5-2004-0136, dated October 25, 2004 and their subsequent revision, dated September 26, 2005 (hereafter, called the Order). The purpose of this Sampling and Analysis Plan (SAP) is to define and summarize the rules of engagement mandated by the Order for sampling storm water and provide a comprehensive field plan for implementation of these rules to the maximum extent practicable. Generalized Site Maps of the East and West Complex of the Port are included in **Figures 1 and 2** in the Plan.

#### **Rules of Engagement for Qualified Storm Event**

- A storm event must have at least 0.1" of rainfall to be considered a qualified storm event. All rain periods with less than 0.1" of rainfall are considered dry weather
- Ideally, the first qualified storm event of the year is to be preceded by at least 30 days of dry weather. The second and third events are preceded by at least three days of dry weather. However, the RWQCB has agreed that no sampling will be performed between sunset and sunrise due to safety concerns; but they strongly suggested that the first qualifying event be obtained even if it is not preceded by 3 days of dry weather and is not the first rainfall of the season.
- Each monitoring event must be separated by at least 10 days.
- Storm water sampling and analysis is conducted for at least three qualified storm events per year.
- Direct discharge samples should be associated with receiving water samples.
- Ideally, receiving water samples should be collected 2 to 6 hours after the commencement of discharge. However, as suggested by the RWQCB staff, receiving water samples may be collected the next morning, if the Port runs out of daylight and the storm continues through the night.
- Both discharge locations and receiving water locations shall be sampled during the same storm event. If 0.1" of rainfall has not occurred before sunset, sampling activities will not be performed that day. As suggested by the RWQCB staff, if the storm continues during night and is still occurring the next morning, sampling should be performed at that time but will be documented as not occurring during the first hour of discharge.
- If 0.1" of rainfall accumulates with 3 hours or less before sunset, making it impossible to complete the receiving water samples by sunset, a decision will be made as to whether to sample the event or not. If the storm is expected to continue to produce precipitation until at least 3 hours prior to sunrise, the direct discharge samples will be collected that afternoon, and the receiving water samples will be collected the next morning and documented as such. If the

- precipitation is expected to end well before 3 hours prior to sunrise, then the storm will be considered a non-qualifying event.
- All actively discharging locations mentioned in the Order will be sampled. Discharge location D-2, which was not mentioned in the Order, will continue to be sampled. Outfalls D-7, D-8, and D-15 have been permanently closed and diverted to other existing discharge points. As of October 2007, Outfall D-10 has been temporarily closed and diverted to other existing discharge points.
  - Sampling activities will not be performed in conditions hazardous to health and safety (strong winds, high flooding, electrical storms, darkness after sundown, etc.).
  - All sampling protocols will be compliant with standard EPA protocols, including 40 CFR Part 136.
  - Samples analyzed for volatile organic compounds (VOCs) and oil and grease will be collected in the field directly into the required and preserved sample container.
  - Ideally, grab samples will be collected within the first 30 minutes after the storm is categorized as a qualified storm event or after flow of storm water has begun through the drain. Should grab samples not be able to be collected in these time constraints, the cause and the actual time after discharge will be documented and presented in the Port's Annual Report.
  - Ideally, industrial site samples will be collected within the first hour after the storm is categorized as a qualified storm event or after flow of storm water has begun through the drain. Should industrial samples not be able to be collected in these time restraints, the cause and the actual time after discharge will be documented and presented in the Port's Annual Report.
  - Ideally, composite samples will be collected as a series of three separate aliquots over a three hour time period. To the extent possible, these aliquots will be collected at the end of the first, second and third hours of the qualified event. Aliquots will then be combined in the Port's field sample room based on the flow-weighted rainfall recorded at the Port for each hour of sample collection. In keeping with 40 CFR Part 136, oil and grease samples will remain in amber jars from the three separate aliquots and submitted for to the laboratory for compositing and analysis. The laboratory will be provided with flow information to use for performing their flow-weighted compositing.

#### **Storm Event-Specific Variables Subject to Rules of Engagement Above**

- For storm events in which 0.1" of precipitation accumulates at least three hours prior to sunset, grab samples will be collected within 30 minutes of the 0.1" mark or from beginning of discharge flow, if flow has not yet begun at a given sample location. For storm events in which the 0.1" mark is met after sunset and precipitation continues through the night, grab samples will be collected during the first 30 minutes after sunrise. It will be noted on the field sheet at what time 0.1" was reached and when the samples were actually collected.
- For storm events in which 0.1" of precipitation accumulates at least three hours before sunset, composite samples will be collected. The first aliquot will be

- collected approximately one hour after the 0.1” mark is met. The second and thirds aliquots will be collected after approximately two and three hours, respectively, of the 0.1” mark. For storm events in which the 0.1” mark is met after sunset and precipitation continues through the night, composite samples will be collected as three aliquots over the first three hours after sunrise. It will be noted on the field sheet at what time 0.1” was reached.
- If 0.1” of rainfall accumulates at 3 hours or less time before sunset, making it impossible to complete the receiving water samples by sunset, a decision will be made as to whether to sample the event or not. If the storm is expected to continue to produce precipitation until at least 3 hours before sunrise, the direct discharge samples will be collected that afternoon, and the receiving water samples will be collected the next morning and documented as such. If the precipitation is expected to end well before 3 hours before sunrise, then the storm will be considered a non-qualifying event.
  - Sampling for the first storm event (“first flush”) of the year holds greater priority than later events and samplers should make extra effort to collect from the first event. In other words, though it is preferred to sample from storm events immediately after the 0.1” level is met, the first flush event sampling will be carried out even if the 0.1” level was reached at nightfall or on a holiday. Sampling teams will arrive and be ready to sample at sunrise the following day.
  - After the first flush event is sampled, the two remaining sample events must be separated by at least 10 days. The first qualifying storm event occurring during daylight hours after the 10 day-period will be sampled. As suggested by the RWQCB staff, it is not overly important that the remaining two sample events be preceded by 3 days of dry weather and may be sampled and documented as such.
  - It is acknowledged from the storm events variables described above that many decisions will be at the discretion of the sampling coordinator at the Port. Field decisions and activities will be summarized in the Port’s Annual Report. The RWQCB staff has suggested that cases, which appear to stray from the strict letter of the Order, will be acceptable if reasons the actions taken are described in the Annual Report to sufficiently defend that the spirit of the Order was maintained.

### **Sample Locations**

Grab and/or composite sampling at the Port will be performed at the locations specified by the Order according to the conditions described above. The outfalls to be sampled include D-4, D-11, D-15, Retention Basin Inlet (RBI) and the West Complex Pump Station (WC). (However, it should be noted that RBI is not a direct discharge outfall, even though it is included in the Order as one. The Port considers it to be an upstream sample point.) Outfall drain D-2, though not mentioned in the Order, will continue to be included for storm sampling since it does directly discharge into receiving waters. As of the October 2007, outfall D-10 was temporarily closed due to construction activities. Should outfall drain D-10 be reactivated as a storm water outfall, it will be sampled during qualified storm events. Outfall drains D-7, D-8 and D-15 have been permanently closed. Outfall locations are shown in **Figures 1 and 2**. Procedures for these activities are included in **Attachment A** of this plan.

The Order mandates grab sampling from receiving water locations for fish toxicity testing and standard analytical laboratory testing. For fish toxicity testing, the Order mandates that samples be collected from three receiving water samples (R-2, R-4, and R-5) and two direct discharge locations (the West Complex and the Retention Basin). For analytical testing, the Order mandates that samples be collected from five receiving water sample locations (R-1 through R-5). The receiving water and the Retention Basin samples will be collected from a boat according to the rules of engagement described above. Sampling techniques are further described below and a Logistics Plan for fish toxicity testing is provided in **Attachment B**. Due to safety concerns, samples will be stored in coolers and placed on ice once the boat is docked. Immediately after all receiving water samples are collected, they will be transported on ice to Sierra Foothill Laboratory (SFL) for short-term chronic toxicity testing analysis according to the Order. Prompt sample delivery is crucial to ensure laboratory analysis is conducted within the required holding time. SFL has been familiarized with requirements of the Order to ensure their laboratory procedures are performed properly. SFL will perform toxicity analysis according to the most recent EPA Test Method 821-R02-013. However, this test method is designed for continuous water sampling. Approval from the permitting agency may be required for samples submitted 36 to 72 hours after sampling. Aside from unexpected circumstances such as airport closure, unavailable fish supply, etc., samples are expected to be submitted within this holding time, including weekend and holiday sampling. To ensure the Order is heeded, continual correspondence will be maintained with SFL as much as possible before, during and after the storm event. The EPA has requested that the sampling documents such as chain of custodies and testing results be provided to them within 20 days of the completion of each toxicity analysis. This is intended to evaluate the Port's compliance with permit monitoring requirement. Procedures for these activities are included in **Attachment A** of this plan.

Sample locations upstream from discharge locations will be sampled for the purpose of locating and detecting possible contaminant sources. Along the northern half of the east complex, three storm drains upstream of outfall D-4 and four locations upstream from outfall D-11 will be sampled for selected contaminants. Should outfall D-10 be reopened, one upstream drain will be sampled. The drainage area from outfall D-2 is small enough that upstream sampling is not necessary. Sample locations upstream from the retention basin, which collects storm water from the southern part of the east complex, will also be monitored and sampled. These locations include the retention basin inlet (which was mentioned above), the outfall storm water from Navy Drive into the south ditch, the upstream and downstream sides of the four check dams along the south ditch, and four storm drains feeding into the south ditch. Ideally, these locations will all be sampled within the first hour after the storm is categorized as a qualified storm event or after flow of storm water has begun through the drain.

Four Port-operated industrial activity sites are subject by the Order to monitoring and sampling consistent with the State's Industrial NPDES General Permit. These industrial sites include the fertilizer warehouse area, equipment maintenance shop, vehicle wash pad area, and the vehicle fueling area. Monitoring of these sites will be performed on a monthly and quarterly basis according to the Order. Sampling is only required to be

performed in two separate storm events each storm season. Samples should be collected within the first hour of discharge. Procedures for these activities are included in **Attachment A** of this plan. Industrial sample locations are shown in **Figures 1 and 2**.

A Pilot Storm Water Treatment System will be used at various sampling locations to assess effective means to treat sites known to be sources of contaminants. Analytical results of samples taken by the Pilot Test System will confirm the effectiveness of the treatment methods at drain locations at which it is operated. Once these pilot tests ensure effective treatment methods, they can be used to determine the appropriateness of the technology for treating the entire volume of storm water at specific storm drains. The Pilot System is scheduled to be in place at sample location D-2 during the 2008-2009 storm season.

### **Required Analytical Tests at Sample Locations**

Contaminants required by the Order (with the exception of D-2 which was not specified in the Order) to be analyzed at the sampling locations are as follows:

<b>Sample Location</b>	<b>Parameter</b>	<b>Sample Type</b>
All Direct Discharge Outfalls	Dissolved Oxygen	Grab
	pH	Grab
	Specific Conductance	Grab
	Temperature	Grab
	Chemical oxygen demand	Grab and Composite
	Diesel Range Organics	Composite
	Gasoline Range Organics	Composite
	Hardness	Composite
	Turbidity	Composite
	Total Dissolved Solids	Composite
	Total Suspended Solids	Composite
D-2*	Total Metals	Composite
	Dissolved Aluminum	Composite
D-4	Polynuclear aromatics (PNA)	Composite
	Heavy Metals	Composite
D-10**	Biochemical Oxygen Demand	Grab
	Oil and Grease	Composite
	Heavy Metals	Composite
D-11	Biochemical Oxygen Demand	Grab
	Oil and Grease	Composite
	Heavy Metals	Composite
	Nitrate/Nitrite	Composite
	Ammonia	Composite
	Total Kjeldahl Nitrogen	Composite
	Sulfate	Composite
	Sulfide	Composite
	Sulfur	Composite

Sample Location	Parameter	Sample Type
D-15	Sulfate	Composite
	Sulfide	Composite
	Sulfur	Composite
	Aluminum	Composite
	Iron	Composite
	Lead	Composite
	Zinc	Composite
Retention Basin Inlet (RBI)	Biochemical Oxygen Demand	Grab
	BTEX	Grab
	MtBE	Composite
	Nitrate/Nitrite	Composite
	Ammonia	Composite
	Total Kjeldahl Nitrogen (TKN)	Composite
	Oil and Grease	Composite
	Pesticides	Composite
	Phosphorus	Composite
	Sulfate	Composite
	Sulfide	Composite
	Sulfur	Composite
	Heavy Metals	Composite
West Complex (WC)	Biochemical Oxygen Demand	Grab
	Volatile organic compounds	Grab
	Oil and Grease	Composite
	Pesticides	Composite
	Polychlorinated biphenols (PCBs)	Composite
	Semivolatile organic compounds	Composite
	Heavy Metals	Composite
R-1	Biochemical Oxygen Demand	Grab
	BTEX	Grab
	MtBE	Grab
	Nitrate/Nitrite	Grab
	Ammonia	Grab
	TKN	Grab
	Oil and Grease	Grab
	Pesticides	Grab
	Phosphorus	Grab
	Sulfate	Grab
	Sulfide	Grab
	Sulfur	Grab
	PNAs	Grab
	Semivolatile organic compounds	Grab
	Volatile organic compounds	Grab
	Heavy Metals	Grab
R-2	Same as for R-1	Same as for R-1
R-3	Same as for R-1	Same as for R-1
R-4	Same as for R-1	Same as for R-1
R-5	Same as for R-1	Same as for R-1

\* Not specified in the Order

\*\* Drain D-10 closed as of October 2007

## Sample Teams

Sampling activities will be divided up between five sampling teams (Teams A through E) to maximize efficiency in meeting requirements of the Order. This will help to ensure grab samples mandated by the Order are collected within a timely manner. Sampling teams will be assigned at the Port depending on availability of personnel. Teams will be chosen so that each team has personnel with ample sampling experience and sufficient training for the assigned task. Training will be performed before the beginning of the storm season to ensure all tasks along with proper health and safety practices have been clearly communicated to all field personnel. Training records will be maintained as required by the Quality Assurance Plan (QAP). The QAP will be discussed in greater detail later in this document.

Each team will also be equipped with standard operating procedures for their tasks. These procedures will be laminated to be durable enough for reference while working in wet field conditions. Sample procedures will be discussed in more detail later in this document.

Sample locations allocated to each sampling team are as follows:

TEAM	Sample Name	Sample Location	Sample Type	Containers	Preserv.
TEAM A	D2-Grab	D-2 last drain	Grab	2-VOAs	H <sub>2</sub> SO <sub>4</sub>
	D4-Grab	D-4 last drain	Grab	2-VOAs	H <sub>2</sub> SO <sub>4</sub>
	D4-US018	Drain 018	Grab	1-125 mL poly 1-250 mL poly 2-VOAs	none HNO <sub>3</sub> H <sub>2</sub> SO <sub>4</sub>
	D4-US049	Drain 049	Grab	1-125 mL poly 1-250 mL poly 2-VOAs	none HNO <sub>3</sub> H <sub>2</sub> SO <sub>4</sub>
	D4-US041	Drain 041	Grab	1-125 mL poly 1-250 mL poly 2-VOAs	none HNO <sub>3</sub> H <sub>2</sub> SO <sub>4</sub>
	D2-Comp	D-2 last drain	Comp	2-gal. tub	none
	D4-Comp	D-4 last drain	Comp	2-gal. tub	none

TEAM	Sample Name	Sample Location	Sample Type	Containers	Preserv.
TEAM B	D10-Grab*	D-10 last drain	Grab	2-VOAs 1-1L poly	H <sub>2</sub> SO <sub>4</sub> none
	D11-Grab	D-11 last drain	Grab	2-VOAs 1-1L poly	H <sub>2</sub> SO <sub>4</sub> none
	D10-US089*	Drain 089	Grab	1-250 mL poly	HNO <sub>3</sub>
	D11-US112	Drain 112	Grab	2-gal. tub	none
	D11-US134	Drain 134	Grab	2-gal. tub	none
	D11-US221	Drain 221	Grab	2-gal. tub	none
	D11-US157	Drain 157	Grab	2-gal. tub	none
	Fertilizer Warehouse Equipment Wash Pad	Industrial Sites Industrial Sites	Grab Grab	2-gal. tub 2-gal. tub	none none
	D10-Comp*	D-10 last drain	Comp	2-gal. tub 1-1L amber	none HCl
	D11-Comp	D-11 last drain	Comp	2-gal. tub 1-1L amber	none HCl

\* Drain D10 will only be sampled once it is reinstalled after construction activity is completed

TEAM	Sample Name	Sample Location	Sample Type	Containers	Preserv.
TEAM C	WC-Grab	WC	Grab	2-VOAs 2-VOAs 2-VOAs 1-1L poly	H <sub>2</sub> SO <sub>4</sub> HCl none none
	RBI-Comp	RBI	Comp	2-gal. tub 1-1L amber	none HCl
	WC-Comp	WC	Comp	2-gal. tub 1-1L amber	none HCl

TEAM D	RBI-Grab	RBI	Grab	2-VOAs 2-VOAs 1-1L poly	H <sub>2</sub> SO <sub>4</sub> HCl none
	D7Navy	Outfall from Navy Dr. into South Ditch	Grab	2-gal. tub	none
	Check Dam Influent 1A	Upstream CD1	Grab	2-gal. tub	none
	Check Dam Effluent 1B	Downstream CD1	Grab		
	Check Dam Influent 2A	Upstream CD2	Grab	2-gal. tub	none
	Check Dam Effluent 2B	Downstream CD2	Grab		
	Check Dam Influent 3A	Upstream CD3	Grab	2-gal. tub	none
	Check Dam Effluent 3B	Downstream CD3	Grab		
	Check Dam Influent 4A	Upstream CD4	Grab	2-gal. tub	none
	Check Dam Effluent 4B	Downstream CD4	Grab		
	Receiving Water	R-1	Grab	2-gal. tub Fish Toxicity	none none



TEAM	Sample Name	Sample Location	Sample Type	Containers	Preserv.
				1-1L amber	HCl
				2-VOAs	HCl
		R-2	Grab	2-gal. tub	none
				Fish Toxicity	none
				1-1L amber	HCl
				2-VOAs	HCl
		R-3	Grab	2-gal. tub	none
				Fish Toxicity	none
				1-1L amber	HCl
				2-VOAs	HCl
		R-4	Grab	2-gal. tub	none
				Fish Toxicity	none
				1-1L amber	HCl
				2-VOAs	HCl
		R-5	Grab	2-gal. tub	none
				Fish Toxicity	none
				1-1L amber	HCl
				2-VOAs	HCl

TEAM	Sample Name	Sample Location	Sample Type	Containers	Preserv.
TEAM E	Upstream South Ditch	Drain 374	Grab	1-125 Poly 1-250 Poly	none HNO <sub>3</sub>
		Drain 831	Grab	1-125 Poly 1-250 Poly	none HNO <sub>4</sub>
		Drain 828	Grab	1-125 Poly 1-250 Poly	none HNO <sub>5</sub>
		Drain 376	Grab	1-125 Poly 1-250 Poly	none HNO <sub>6</sub>
	Vehicle Fueling Area	Industrial Sites	Grab	2-gal. tub	none
	Maintenance Shop	Industrial Sites	Grab	2-gal. tub	none

### Sample Techniques and Training

Two primary types of samples will be performed during each sampling event grab and composite. The Order mandates that direct discharge grab samples will be collected within the first 30 minutes of the storm events, unless conditions described in the Rules of Engagement above occur.

As mentioned above, composite samples will be flow-weighted. This means that storm water collected at multiple different times will be composited into one sample in a ratio proportional to the amount of rainfall observed at those times. For example, if 0.5" of

rain has fallen after one hour, 0.75” has fallen during the second hour and 0.5” the third, these three separate samples will be composited at a ratio of 2:3:2. Flow weights will be estimated from observations of the East and West Complex hourly rainfall data found on the Port website (<http://www.portofstockton.com/weather.html>).

The Order mandates that receiving water grab samples be collected within 2 to 6 hours after runoff commencement. Samples are also mandated to be collected at mid-depth and in mid-stream of the water body. Samples will be collected from a boat provided by the Port. A logistics plan for toxicity storm water sampling and testing is provided in **Attachment B**.

All sampling and analysis will be performed according to EPA standards. This is described in depth in the Quality Assurance Plan described below and included in **Attachment C**.

Sampling techniques are described in the Procedures included in **Attachment A**. Techniques will be witnessed and/or practiced by all potential samplers during the sampling training event before the beginning of the storm season. Sampling personnel at the training event will have opportunity to familiarize themselves with all field equipment in order to be fully prepared and capable to use it in the field. Personnel will also have opportunity to tour the Port and see all the sampling locations. Trial runs will be performed at one or two drains to make sure personnel are clearly aware of the order and protocol of activities involved in collection of grab and composite samples.

The sampling training event will also include a tour of the receiving water around the Port. This will involve using a boat to visit the Receiving Water sample locations. This part of the training will not be mandatory for personnel who already have experience collecting receiving water samples from the boat.

### **Quality Assurance**

Under the Order, the Port is required to have in place a Quality Assurance Plan (QAP). Quality assurance is vital to ensuring that all storm water data is representative of actual conditions. The QAP will be available for reference in the Port’s lab sample room. The QAP is included in **Attachment C** of this Sampling and Analysis Plan. Additional QAP Procedures are included in the Plan.

### **Health and Safety**

Health and safety is of primary importance for all activities conducted at the Port, especially during hazardous conditions common to storm events. Hazardous conditions may include the following:

- Hazardous weather conditions (e.g. high winds, flooding, lightning, etc.)
- Physical hazards (pinch points on lid covers, traffic hazards, flying debris, slips/trips/falls, lifting heavy objects, etc.)

- Chemical hazards (e.g. acid preservative from sample containers, contaminants from storm water, etc.)
- Biological hazards (e.g. rodents, snakes, insect vectors, etc.)

Pertinent personal protection equipment (PPE) will be used during sampling activities. All sampling personnel will be trained before the storm season. A Health and Safety Plan will be available for all sampling personnel. This plan will be reviewed with personnel and implemented in the field. The Health and Safety Plan will be kept in all sampling vehicles for immediate access in the field. A copy of the Health and Safety Plan is included in **Attachment D**.

FIGURES:

Figure 1: Site Map of Port of Stockton – East Complex

Figure 2: Site Map of Port of Stockton – West Complex

ATTACHMENTS:

Attachment A: Procedures

Attachment B: Logistics Plan for Toxicity Sampling

Attachment C: Quality Assurance Plan

Attachment D: Health and Safety Plan

## Attachment A - Procedures

## Attachment B – Logistics Plan for Toxicity Sampling

## Attachment C – Quality Assurance Plan

## Attachment D – Health and Safety Plan